

Power's

Second in a three-part series about how electricity is produced, transmitted and delivered to cooperative members

**By David Logeman,
Contributing Writer**

Just how does electricity move around? How does it get from the point where it is generated to the point where it's consumed?

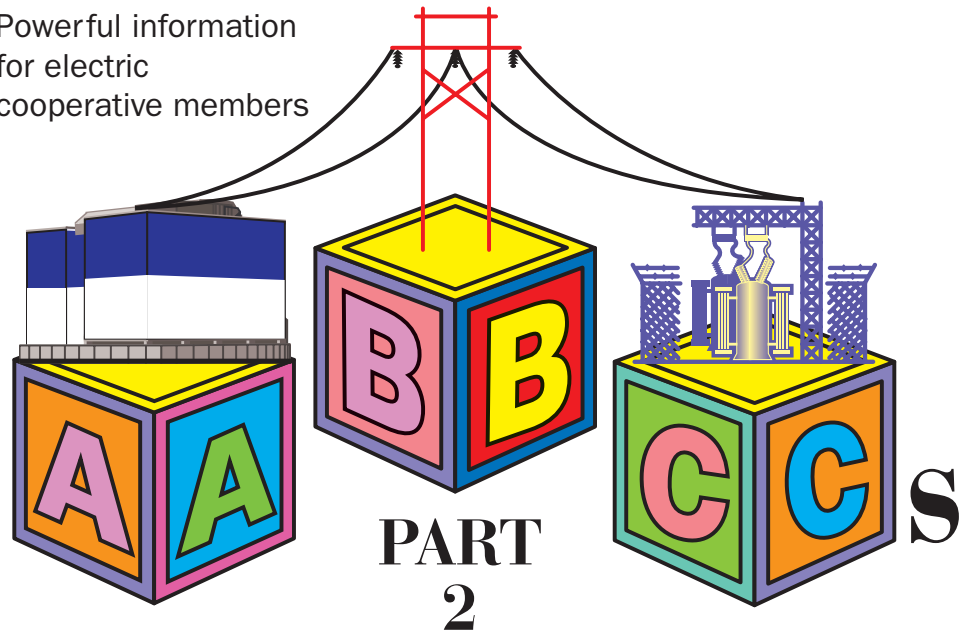
In the first of a three-part series of articles on where power comes from, last month we looked at the generation of power. In this article, the second in the series, we will look at how electricity moves from a generator across a network of high-power transmission lines to substations where the voltage is lowered. Next month, we will see how power ultimately is distributed to homes and businesses.

Birth of a network

In 1879, Thomas Edison produced the first practical light bulb that would last longer than a minute or two. Only three years after demonstrating his incandescent bulb, Edison opened the Pearl Street station in New York City. This station was the world's first commercial power plant. Once the light bulb had demonstrated the practical use of electricity, and the power station had been built, a path had to be created to get the electricity from the power station to power users. This path and others like it would ultimately become the network of power lines connecting power plants to consumers all over America.

A power plant produces electricity at about 25,000 volts. While 25,000 volts may sound high, it's really not. In order to move power efficiently on a transmission system, the voltage is boosted in order to move long

Powerful information
for electric
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distances. On the Central-Santee Cooper transmission system, power is transmitted at either 115,000 or 230,000 volts. Some older transmission lines operate at 69,000 volts, but all of the transmission lines being built today operate at either one of the two higher voltages. Delivery of the high-voltage power is made at the cooperative's substation. Within the substation, the voltage is lowered and moved through the distribution system where it is lowered one last time at either a pole-mounted or pad-mounted transformer to a voltage useable in the home or business.

One truly remarkable fact becomes apparent about the transmission system owned and operated by the electric cooperatives. The cooperatives have built the only true statewide transmission system in South Carolina. From its beginnings in 1948, when 14 electric cooperatives formed Central Electric Power Cooperative to transmit bulk electric power to their systems, this 2,511-mile network of transmission lines covers much of the lower two-thirds of South Carolina. Coupled with 2,390 miles of line owned and operated by Santee Cooper, a system totaling 4,901 miles constitutes the state's largest transmission network. In fact, much of the transmission system that was originally built by Central, especially in the early years, has been leased to Santee Cooper to operate and maintain as part of what is referred to as the bulk power system.



David Logeman

The South Carolina Public Service Authority began in the 1930s as a project to improve navigation and flood control along the Santee and the Cooper River systems. Hence the name, Santee Cooper. As a part of the project, hydroelectric generators were installed to produce electricity. During World War II, additional generating capacity was constructed to assist in the war effort. Once the war was over, Santee Cooper was looking for a market for the power. Coincidentally, the electric cooperatives were growing rapidly. A partnership between the cooperatives and Santee Cooper seemed beneficial for all. Central Electric Power Cooperative was formed in 1948 to transmit Santee Cooper's power to the electric cooperatives. This partnership has lasted well over 50 years and has benefited South Carolina tremendously.

In 1958, five electric cooperatives in the Upstate formed Saluda River Electric Cooperative to provide roughly the same service for those systems. The reason two transmission cooperatives were formed was partly due to geography. The cooperatives in the lower part of the state had been buying their power from either Santee Cooper or South Carolina Electric and Gas Company directly, under contracts negotiated individually between each of the cooperatives and those companies. The five cooperatives in the upstate were buying their power from Duke Power Company. At the time, it made sense to form separate companies due to the preferences in how the two systems wished to purchase wholesale power. Today, New Horizon Electric Cooperative, an offshoot of Saluda River Electric Cooperative, provides

transmission service to Upstate cooperatives over a system of 126 miles of transmission lines. This system is interconnected with the Duke system to provide true network service to cooperatives throughout the Upstate. In 1999, Central and Saluda River agreed to unite into one generation-and-transmission cooperative to serve all 20 of the state's distribution systems. That process will be completed by early 2009.

As you might guess, the transmission system has grown over the years in size and complexity. No major transmission grid operates in a vacuum. The cooperative-Santee Cooper system is interconnected with Duke Power, Progress Energy, South Carolina Electric and Gas, the Southern Company and others. These interconnections allow companies to buy and sell power to each other, and, also, to provide additional reliability as one system can back the other up during an emergency. But as these interconnections have had real benefits, they have also presented challenges.

The greatest challenges of building and operating transmission grids have often centered around cost. It is quite expensive to construct transmission lines. The costs of wires, structures, land and rights of way to place the lines all are increasing. More importantly, they are becoming more difficult to obtain. South Carolina's population has grown to the point that it is becoming more and more difficult and costly to route new transmission lines around populated regions. Extra care must be taken if lines are to be built, if at all, in environmentally sensitive areas. An ever-increasing appetite for power, often in undeveloped areas, challenges cooperatives to provide reliable electric service. No one, including your electric cooperative, wants to damage the environment or disturb cultural or historically significant places. Cooperatives do everything within their ability and control to protect these precious resources. The fact remains that cooperatives have an obligation to provide power to an increasing population and a growing economy. Balancing these needs takes a great effort and a solemn responsibility that cooperatives do not take lightly.

Most of these challenges are ones that cooperatives have faced before. The whole electric utility industry, however, has undergone some pretty radical changes since the 1990s. Perhaps you remember the debates regarding deregulation of the electric power industry. Fortunately, the South Carolina legislature decided to take a go-slow approach and allow other states to experiment with power deregulation. Generally, these experiments have not produced the benefits that deregulation proponents promised. The debate over the pros and cons of a truly open

open market.

Experts continue to debate how successful this experiment has been, but the point it illustrates is how different the challenges have become. Twenty years ago, no one expected change of this nature. The transmission systems built by each operating company were constructed to meet the needs of that company. Interconnections were made for the convenience of the companies but were operated to the benefit of local consumers. After all, that's exactly what state and federal regulators had always wanted, and the power companies had done a good job in providing it. Frankly, the nation's transmission grid was never intended to serve as an open-access highway for power and was ill suited for that purpose.

There will be more debate regarding the makeup and the character of the nation's critical electric infrastructure. The electric cooperatives of South Carolina are monitoring and actively participating in the debate. As we discuss these issues in various forums, we are always mindful that cooperatives exist only for the benefit of the members. Cooperatives will not be looking for ways to influence the conversation so that they might be able to "game the system" to our advantage for the benefit of a few.



**An ever-increasing
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A new transmission line awaits completion along South Carolina's fast-growing coast.

and competitive electric energy market continues. Once a model demonstrates true and real benefits to all members, then cooperatives will endorse it. Until then, we'll just wait and see — and learn from the mistakes of others.

As a part of deregulation, the Federal Energy Regulatory Commission (FERC) changed the rules for how companies handle their transmission assets. The push was to open access to the bulk transmission system and help foster a deregulated wholesale market. In some states, electric companies divested themselves of their transmission assets to third parties. Regional Transmission Organizations (RTOs) were formed to provide an open-access highway for all suppliers of electric power from traditional electric utility companies to independent power producers, to produce and sell power in an

Cooperative promise

There is no way to know the future or what it might bring, and, as the Greek philosopher Heraclitus said, "Nothing endures but change." But as certainly as circumstances will change, what will not change is your cooperative's commitment to providing safe and reliable electric service at lowest possible cost in keeping with sound financial and environmental practices. From the generating station, through the transmission grid, and finally through the local distribution system to the ultimate consumer, your electric cooperative systems are meeting today's challenges and planning for the future.

David Logeman is director of power supply for Central Electric Power Cooperative, which transmits and provides power generated by the state-owned utility, Santee Cooper, and others, to your electric cooperative. He lives in Columbia. ♣